REMARKS

I. PENDING CLAIMS AND SUPPORT FOR AMENDMENTS

Upon entry of this amendment, claims 1-28 will be pending in this application. Claims 27-28 have been withdrawn from consideration by the Examiner as being drawn to a non-elected invention.

Applicants have amended claim 11 to replace the terminology "capable of", to which the Examiner objects, with the terminology "adapted for", which has an equivalent meaning and should be unobjectionable, as it has been used in numerous other issued patents.

Applicants have amended claim 12 to delete the parentheses as the Examiner suggests.

Applicants have amended claims 13, 14, and 23 to clarify that the products recited therein no longer have water present, and that the silica recited in the claims is silica binder formed from colloidal silica, as described throughout the specification.

Applicants have amended claim 17 to specify that the basis for the amounts of ingredients is total weight of solids added to the slurry. Support for this amendment can be found at page 11 of the specification.

Applicants have amended claims 18 and 19 to clarify the basis for the percentages recited therein.

Applicants have amended claims 21, 22, and 25 to eliminate the terminology "mains" and to clarify that the fibre amounts are based on fibre solids per weight of white water component. Support for this amendment can be found in the specification at page 13, lines 7-9.

Applicants have amended claim 25 to recite that the soda value is below 0.1 wt%. Support can be found at page 10 of the specification.

No new matter has been added.

II. INDEFINITENESS REJECTIONS

At pages 5-6 of the Office action, the Examiner has rejected claims 4-25 as indefinite under 35 U.S.C. § 112, second paragraph. Applicants respectfully traverse this rejection and request reconsideration and withdrawal thereof.

The Examiner has objected to the terminology "essentially free of aluminium" as this term is used in claim 4. The Examiner indicates that the claim is unclear as to whether this terminology imposes an upper limit on aluminium that is lower than the 1% limit imposed by claim 1, an upper limit of 0.1% as imposed by claim 3. The intention of this terminology, as is indicated by the specification at page 4, lines 4-10, is that the amount of aluminium have a maximum that is below even 0.1%, as the Examiner appears to appreciate. Even more particularly, the terminology is intended to convey that, while the amount of aluminium might be above the detection limits for some types of analysis, the composition behaves as though no aluminium is present.

The remaining objections have been addressed by the above amendments. Applicants respectfully submit that the one of skill in this art would readily be able to determine whether a particular composite falls within the scope of the claims. As a result, the claims fully comply with the requirements of 35 U.S.C. § 112, second paragraph. *See In re Miller*, 169 USPQ 597 (CCPA 1971). This is particularly true when any perceived ambiguities in the claims are read in light of the specification.

See In re Johnson, 194 USPQ 187 (CCPA 1977). Accordingly, the Examiner's rejection should be withdrawn.

III. ANTICIPATION/OBVIOUSNESS REJECTIONS

At page 4 of the Office action, the Examiner has rejected claims 1-26 under 35 U.S.C. § 102(a or b) and/or under 35 U.S.C. § 103(a) over Hart (U.S. Patent No. 6,287,994), Hart (U.S. Patent No. 6,043,172), Hart (U.S. Patent No. 6,043,173), Delvaux et al. (U.S. Patent No. 5,880,046), Vandermeer (U.S. Patent No. 6,214,102), Couture et al. (U.S. Patent No. 5,912,201), Besnard et al. (U.S. Patent No. 5,290,350), or Jubb et al. (U.S. Patent No. 6,180,546). Applicants respectfully traverse these rejections and request reconsideration and withdrawal thereof.

A. Introduction

The total rationale provided by the Examiner in support of the (at least) 16 rejections is:

> All of the above cited references teach a composite [containing] ceramic fiber (e.g. alkaline earth metal silicate and colloidal silicate) in amounts overlapping the instantly claimed invention. Even if not anticipated, overlapping ranges of amounts would have been prima facie obvious to one of ordinary skill in the art. (see respective claims).

Applicants note that it is not clear whether each reference is being alleged to anticipate every claim, or if not, then which references anticipate which claims. The Examiner does not point out the portions of the references on which he relies. He does not explain whether the references are considered singly or in combination for purpose of obviousness, and if in combination, which portions of the references are combined and what motivation exists for their combination. Accordingly, Applicants

have made several assumptions in responding to the Office action. Presumably, in light of the extreme brevity of the Office action, if these assumptions prove incorrect the Examiner will not hold Applicants' amendment non-responsive and will not make the next action final. For purposes of this analysis, Applicants assume that each reference is being applied individually; that the Examiner is asserting that each reference both anticipates and renders obvious every claim under examination on the merits; that none of the reference teachings are being combined to show obviousness, and that Hart '172 and Hart '994 can be treated together, since they have the same disclosure.

B. Background of Invention

Prior to addressing each individual reference and rejection, Applicants believe that a description of the background to this invention may prove helpful.

Refractory ceramic fibre, or RCF, is known in the art for use in various products, some of which include inorganic binders, such as colloidal silica, alumina, or clay. Because of assertions that asbestos has caused respiratory diseases, many other inhalable inorganic fibres are also under suspicion of causing similar problems. However, because of the wide utility of these fibers and the lack of availability of ready substitutes, it has been long desired to obtain inorganic fibre products that are saline soluble, on the theory that if such fibers are inhaled, their shortened lifetime under physiological conditions will decrease or eliminate the likelihood that the fibres will be implicated in respiratory problems. One type of such saline soluble fibres are the alkaline-earth metal silicate fibres (AES).

One limitation to the usefulness of many saline soluble fibres is the inability of many such fibres to function at high service temperatures (e.g., above 1100 °C); because the normal binders and fillers used with these fibre products can fail at these high temperatures, materials containing these fibres are not necessarily suitable as direct replacements for RCF products in high service temperature applications.

Applicants have sought to address this problem by finding the source or cause of this failure, and engineer new materials that are able to withstand high service temperatures. In the course of this effort, Applicants have found that the presence of aluminium is deleterious to material properties at temperatures above 1100 °C. They have also found that the presence of sodium and/or boron is deleterious at temperatures above 1200 °C. Applicants have sought to provide materials suitable for use at these high temperatures that eliminate or minimize the presence of one or more of these components, while continuing to exhibit the desirable properties found in materials that contain the components. Applicants have found that bonding agents and fillers tend to be sources of undesired levels of aluminum, sodium and/or boron.

As a result of this investigation, Applicants have found that their goals can be achieved by providing composite materials with colloidal silica bonded, alkaline earth silicate fibres wherein any bonding agents or fillers have a sufficiently low aluminum content that the resulting material has a total aluminum content of below 1%, calculated as Al_2O_3, preferably having levels of aluminum that are essentially undetectable. In addition, Applicants have found it beneficial to prepare composites from materials having levels of sodium sufficiently low that the resulting material contains less than 1 wt% sodium, calculated as Na_2O, preferably having levels of

sodium that are essentially undetectable. Similarly, using materials that provide levels of boron, calculated as B_2O_3, that are below 0.5 wt%, and more desirably below 0.1 wt%, has also been found desirable.

Claims 1-10 reflect these low levels of aluminum, sodium, and boron. Claim 12 indicates that the fibre has a service temperature above 1200 °C. Additional features of materials particularly suitable for vacuum forming are recited in claims 12-14, 17, and 21-25. Claims to materials made in paper form include claims 15 and 16. Materials made using starch are recited in claims 18-20.

C. Hart '994 and '172

Neither Hart reference discloses or even suggests a basic feature of the claimed invention, namely that limiting the amount of alumina in the binder of a composite material will allow that material to be used at high service temperatures. Because the Hart references fail to disclose low alumina colloidal silica binders, or materials that contain less than 1 wt% aluminum, they do not anticipate any of Applicants' claims. In fact, Hart explicitly suggests that significant quantities of alumina be included, by teaching calcium-aluminum silicate fibres at column 3, lines 44-46.

Moreover, Hart completely fails to recognize the significance of a low alumina binder. To the contrary, Hart teach away from the claimed invention because he discloses colloidal alumina is a ready substitute for colloidal silica at column 4, lines 62-65. This teaching of equivalence negates any possible inference that Hart taught, suggested, or even recognized the importance of a low alumina binder. In light of this

teaching away, Applicants submit that the Examiner has failed to establish a *prima facie* case of obviousness.

D. Hart '173

While this disclosure is not identical to that of Hart '172 or Hart '994, it is similar in that it (1) fails to teach or suggest a low alumina content in the composite material (like the previous Hart references, it teaches that the fibre itself can desirably contain significant quantities of alumina) and (2) it also teaches that colloidal alumina is equivalent to colloidal silica, thereby teaching away from the claimed invention.

For the reasons described above with respect to Hart '172 and Hart '994, this reference does not anticipate or render obvious any of Applicants' claims.

E. Delvaux et al.

Delvaux et al. disclose a composition containing wollastonite as the heat resistant inorganic material, combined with colloidal silica. However, wollastonite is an acicular crystalline material, the "fibres" of which are orders of magnitude smaller in diameter than refractory ceramic fibres formed from an oxide melt. Thus, wollastonite is not within the term "alkaline earth silicate fibre" as this term is used in Applicants' claims.

Even if one considers wollastonite to be a "fibre" within the meaning of the claim, there is no teaching or suggestion in Delvaux et al. that aluminum content has any effect on the fibre's performance at high temperatures, much less a suggestion to limit the amount of aluminum present in the fibre or the binder. Absent this teaching, Delvaux et al. fails to anticipate any of Applicants' claims.

In fact, Delvaux et al. requires the addition of a solution of phosphoric acid that has been partially neutralized with vermiculite. Vermiculite is hydrated magnesium-iron-aluminum silicate. As a result, not only is there no motivation to modify the Delvaux et al. material to limit the amount of aluminum present, but Delvaux et al. contain a positive teaching to include materials that contain significant amounts of alumina. Delvaux et al. therefore teach away from Applicants' invention. As a result, there is no prima facie case of obviousness based on Delvaux et al. Both rejections should therefore be withdrawn.

F. Vandermeer

As with each of the previously described references, Vandermeer fails to teach or suggest any connection between the amount of aluminum present in the composite and its performance at high temperatures, or that the amount of aluminum should be limited to the amounts recited in the claims. Moreover, Vandermeer discloses compositions in which fibre containing alumina can be used (column 3, line 30) and compositions having alumina-containing fillers (column 3, lines 62-63). Vandermeer thus also teaches away from Applicants' claimed invention. Because Vandermeer does not disclose each limitation of Applicants' claims, it does not anticipate them. Since there is no motivation to modify Vandermeer in such a way as to obtain each limitation in Applicants' claims, Vandermeer does not render obvious any of the claims. Both rejections should therefore be withdrawn.

G. Couture et al.

Applicants fail to see the relevance of this reference to any of the claims. Couture et al. relates to a process for vacuum-forming a shaped article from a slurry

and self-sintering this material at high temperatures. The only description of fibrous materials is a passing reference in the Background to fibrous ceramic materials that can be used as cups, sleeves, or funnels. These articles use organic resin binders that burn away at liquid metal temperatures, resulting in disintegration of the fibrous shape. See column 1, lines 34-40. Clearly, this disclosure is not motivation to do anything with the fibre composition, but rather suggests adopting the invention disclosed by Couture et al. which, significantly, discloses the equivalence of colloidal silica and colloidal alumina at column 2, lines 19-22. In light of its failure to teach or suggest limiting the amount of aluminum as recited in Applicants' claims, Couture et al. neither anticipates nor renders obvious any of Applicants' claims.

H. Besnard

Besnard teaches shaped articles made from inorganic fibres, inorganic fillers, and binders. As with the other references cited by the Examiner, Besnard completely fails to teach or suggest limiting the amount of aluminum in the article, or that such a limitation will make the article suitable for high temperature uses. As with many of the other cited references, Besnard actually teaches away from Applicants' invention by disclosing fibers with significant alumina contents (column 2, lines 11-15) and filler materials containing significant quantities of alumina (column 2, lines 22-25), as well as the equivalence of these high alumina fillers with colloidal silica. Thus, there is no motivation for one of ordinary skill in the art to produce a composite material having the low alumina contents recited in Applicants' claims, and the Examiner's rejections should be withdrawn.

I. Jubb et al.

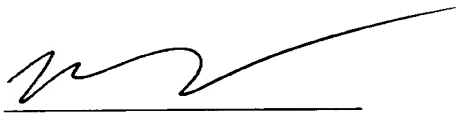
Jubb et al. disclose fibres of the type used in Applicants' invention. While Jubb et al. recognized that limiting the amount of alumina in the fibres contributed to decreased shrinkage, Jubb et al. disclose use of their fibre in materials that do not include low alumina binders. Jubb et al. does disclose the relationship between low alumina binders or fillers, such as low-alumina colloidal silica, in achieving paper or board having high service temperatures. Again, Jubb et al. does not disclose each element of Applicants' claims, and therefore does not anticipate the claims, and also does not motivation one of ordinary skill in the art to use a low-alumina binder or filler. For these reasons, both rejections over Jubb et al. should be withdrawn.

CONCLUSION

Applicants respectfully submit that the claims are in condition for immediate allowance, and an early notification to this effect is earnestly solicited. If the Examiner believes that additional issues remain, he is respectfully requested to contact the undersigned to arrange for an interview prior to issuance of a final office action.

The Commissioner is hereby authorized to charge any deficiencies or credit any overpayment to Deposit Order Account No. 11-0855.

Respectfully submitted,



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